



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/050,654	01/16/2002	Ling Chen	005027-02 CPI/COPPER	6065

32588 7590 09/17/2003

APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

MEEKS, TIMOTHY HOWARD

ART UNIT	PAPER NUMBER
----------	--------------

1762

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/050,654	<b>Applicant(s)</b> CHEN ET AL.	
	<b>Examiner</b> Timothy H. Meeks	<b>Art Unit</b> 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**P riod for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                      | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                             | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>04/02</u> . | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 8-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Powell et al. (6,464,779).

The claimed process is disclosed at col. 5, lines 44-68, col. 6, lines 27-33 and 38-40, and claims 12-20.

Claims 1-6 and 12-17 are rejected under 35 U.S.C. 102(e) as being anticipated by George et al. (2002/0018849).

The claimed process is disclosed at figure 1 and paragraphs 21, 22, and 26.

Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Klaus et al. (6,090,442).

The claimed process is disclosed at col. 2, line 47 to col. 4, line 15.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1762

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Powell in view of Applicants' admission of the prior art at page 3, line 18 to page 4, line 5.

Powell discloses use of ALD to deposit the copper layers but is silent as to the specific ALD steps of the process and therefore does not explicitly disclose purging to remove excess reactants and byproducts between adsorption and reaction steps. However, because applicants admit at the cited portions of the specification that it is known that

"In ALD, the substrate is heated to a temperature such that when a first gas is introduced into a reaction chamber, it chemisorbs on the substrate surface, forming a monolayer. An exact monolayer can be formed because the first layer of the gaseous species is relatively strongly bonded to the surface of the substrate by the chemisorption reaction while any excess reactant is relatively weakly bonded to the chemisorbed monolayer. The excess first gaseous reactant can then be removed from the reaction chamber. This removal may take place by, for example, evacuating the reaction chamber with a vacuum pump or by purging the reaction chamber with an inert gas. Ideally, the monolayer of the first gaseous species remains on the heated substrate surface after the removal of the excess reactant. Next, a second gaseous reactant is introduced into the reaction chamber. The second gaseous reactant reacts with the monolayer to produce the desired solid thin film. The

Art Unit: 1762

excess of the second reactant, along with any reaction by-products, are then removed from the reaction chamber. Again, the removal may take place by means of evacuating the reaction chamber or purging the reaction chamber with an inert gas. "

it would have been obvious to one of ordinary skill in the art at the time the invention was made to conduct the ALD process by this conventional sequence of steps with a reasonable expectation of its being effective for providing the layers by ALD.

Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Powell in view of Sneh (6,503,330).

Powell discloses use of ALD to deposit the copper layers but is silent as to the specific ALD steps of the process and therefore does not explicitly disclose purging to remove excess reactants and byproducts between adsorption and reaction steps or continuously flowing a carrier gas to purge as well. However, because Sneh discloses that such continual flowing of a carrier gas is effective for both delivering the reacts to the ALD chamber and purging the chamber (col. 10, lines 40-56), it would have been obvious to perform such steps with the reasonable expectation of its being effective for performing the ALD process.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over George et al. in view of Sneh.

Continuously flowing a carrier gas to purge is obvious in view of Sneh for the reasons set forth above.

Art Unit: 1762

***Double Patenting***

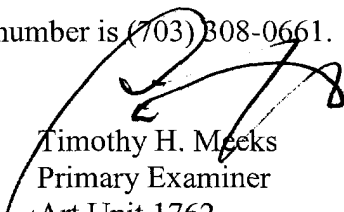
Claims 1-20 of this application conflict with claims 1-20 of Application No. 10/052,049. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

Claims 1-20 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-20 of copending Application No. 10/052,049. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on Mon., Tues., Thurs.(6-6:30), Fri.(6:30-10:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

  
Timothy H. Meeks  
Primary Examiner  
Art Unit 1762